

Nitrate FS

o Intended Use

For detection of nitrate (and nitrite) in water (drinking water, groundwater, surface water, well water). For other applications, refer to specific application bulletins.

o Principle

The Nitrate FS is a semi-quantitative, colorimetric assay for the detection of nitrate and nitrite based on the reduction of nitrate to nitrite and subsequent azo dye formation. Nitrite which may be present in a sample cannot be distinguished from nitrite which has been produced from nitrate. Color developed is proportional to the concentration of nitrate in the sample.

o Reagents and Components

1. Nitrate Reagent.

50 tubes containing zinc, sulfanilamide, and N-1-naphthyl-ethylenediamine dichloride.

2. Developing Reagent.

One 25 mL vial containing 2% tartaric acid.

3. Reagent Droppers.

Two droppers to be used for addition of sample and developing reagent.

4. Color block card.

One card calibrating color development at 0.5, 2.5, 5.0 and 10 ppm nitrate-nitrogen.

o Component Storage and Stability

Store all reagents at room temperature. Reagents may be used until the expiration date on the box.

It is suggested that the color chart be protected from light whenever possible. Prolonged exposure to some sources of light may cause colors to shift and fade.

Consult federal, state and local regulations for proper disposal of all reagents.

o Materials Required but Not Provided

Timer, stopwatch or watch with second hand.

o Optional Materials:

Test tube rack to hold 12 x 75 mm tubes.

o Sample Information

This procedure is recommended for use with water samples. Other samples may require modifications to the procedure and should be thoroughly validated.

Samples containing gross particulate matter should be filtered (e.g. 0.2 μ m Anotop™ 25 Plus, Whatman, Inc.) or allowed to settle so particulate can be separated.

Heavily pigmented samples may obscure color interpretation by color card comparison. If color interference is suspected, it is recommended that a sample blank be used during interpretation (i.e. hold tube containing unreacted sample blank in front of color blocks during interpretation of test sample to correct for the sample pigmentation).

Certain metal ions may cause interferences in the Nitrate FS kit, especially copper and mercury at concentrations as low as 0.25 ppm (mg/L). The presence of the following substances up to 500 ppm were found to have no significant effect on Nitrate FS results: manganese and zinc. In addition, magnesium up to 250 ppm, iron and nickel up to 100 ppm, calcium and peroxide up to 50 ppm, sulfite up to 10 ppm and silicates and sulfate up to 1000 ppm showed no interference in the assay.

Studies indicate that the working pH range is pH 4 to 11. Samples below pH 4 develop prematurely but will accurately determine nitrate if the final volume is adjusted to 1 mL.

o Reagent Preparation

All reagents should be allowed to come to a constant temperature. The assay will perform according to specifications if run between 4 and 30°C.

o Procedural Notes and Precautions

Do not use any reagents beyond their stated shelf life.

A small portion of the nitrate reagent will remain undissolved and fall to the bottom of the tube; this will not affect test results.

Accuracy will be influenced by the operator's ability to distinguish variations in color.

o Limitations

Nitrite will react in this test; the Nitrate FS detects nitrate and nitrite.

The Nitrate FS provides screening results.

o Assay Procedure

Read Reagent Preparation, Procedural Notes and Precautions before proceeding.

I. Upon Opening Kit

1. Label one dropper for sample delivery and one dropper for adding Developing Reagent.

II. Procedure

1. Rinse sample dropper several times with the water to be tested.
2. Draw sample above the 0.5 mL mark on dropper and dispense excess sample dropwise until the water level is approximately equal with the 0.5 mL mark.
3. Add the sample to the Nitrate Reagent tube.
4. Shake tube briefly to mix.
5. Using the Developing Reagent dropper, add 0.5 mL Developing Reagent as described in steps 1 through 3.
6. Shake tube briefly to mix.
7. Read results after 3 minutes.

III. Interpretation

1. Compare color in tube to closest matching color block on color chart.

potassium nitrate = nitrate-nitrogen x 7.0
nitrate = nitrate-nitrogen x 4.4

Expected Results
Nitrite will interfere in this test; see Limitations Section.

Concentrations as low as 0.25 ppm (mg/L) of copper or mercury will inhibit color development.

Ten people participated in a blind study of 100 nitrate samples. Five levels of nitrate concentrations were used: 0, 0.5, 2.5, 5.0 and 10 ppm $\text{NO}_3\text{-N}$. Of the 100 tests, 99 (99%) were correctly identified. One sample at 5 ppm was misidentified as 10 ppm.

For ordering or technical assistance contact:

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Nitrate FS, 50 Test Kit A00243